

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Kurt W. Weber et al. ) Group Art Unit 3722  
Appl. No. : 10/041,767 )  
Filed : January 7, 2002 )  
For : INCREMENTAL STEP )  
DRILLING SYSTEM AND )  
METHOD )  
Examiner : Bishop, Steven C. )

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DECLARATION OF KURT W. WEBER PURSUANT TO 37 C.F.R. § 1.132

Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

I, Kurt W. Weber, do declare as follows:

1. I am a citizen of the United States and I reside at 29732 Tamarron, Laguna Niguel, California.
2. I am currently the Vice-President of Engineering at Excellon Automation Company of Torrance California. ("Excellon"). Excellon is a leading manufacture of printed circuit board drilling machines. I joined Excellon in April of 1996 as an Applications Engineer. In November 1996, I was promoted to Applications Engineering Manager. Since then, I have been promoted to Applied Technologies Manager and onto Director and Vice-President of Engineering. I have over 28 years of experience in both printed circuit manufacturing and machine building. Specifically, before joining Excellon, I worked for seven years at Pluritec, another leading manufacturer of printed circuit board drilling machines. At Pluritec, I was Manager of Technical Services. My duties included the setting up a field service engineering group in the United States along with a spare parts organization. Before working at Pluritec, I worked for 15 years within the Kollmorgen Corporation, which is a leading manufacture of process/environmental controls, tools and components. During those 15 years, I worked within the Photocircuits Corporation's Divisions, the Multiwire Division, the PCK

Appl. No. : 10/041,767  
Filed : January 7, 2002

Technology Divisions and Electronics Equipment Division. At Kollmorgen Corporation, I held various positions including Research and Development Engineer and Licensing Service Engineer.

3. I am one of the inventors of the subject matter claimed in U.S. Patent Application Serial No. 10/041,767, filed January 2, 2002 (the '767 application), as amended by the Amendment filed on September 30, 2003. For the purposes of this Declaration, I have reviewed the specification of the '767 application, the amended claims of the '767 application and the prior art described below.

4. I have personal knowledge of the following facts and if called upon as a witness to competently testify thereto, I could and would do so.

5. I developed the "EXCELLON HVP, 689 and Concept 129" printed circuit board drilling systems, which are manufactured and sold by Excellon. For drilling circuit boards that are greater than .250 inches in thickness, these drilling systems are substantially identical in relevant aspects to the incremental step drilling system disclosed in the above-captioned patent application.

For example, with respect to independent Claim 18, the EXCELLON HVP, 689 and Concept 129 drilling systems embody a printed circuit board drilling machine in combination with a printed circuit board. The drilling machine has a worktable for supporting the printed circuit board, a spindle, a drill bit and a controller. The controller is configured to instruct the drilling machine to drill to a point in the printed circuit board, to retract the drill bit a retract distance that is configured such that a tip end of the drill bit remains below a top surface of the printed circuit board, and to drill a distance greater than the retract distance into the printed circuit board.

With respect to independent Claim 35, the EXCELLON HVP, 689 and Concept 129 drilling systems embody a method for operating a printed circuit board drilling machine having a worktable, a spindle, a drill bit and a controller configured to control the operation of the drilling machine. Operation of the EXCELLON HVP, 689 and Concept 129 systems comprise positioning a printed circuit board on the worktable; drilling to a point in the printed circuit board; retracting the drill bit a retract distance, the retract distance configured such that a tip end of the drill bit remains below a top surface of the printed circuit board; and drilling a distance greater than the retract distance into the printed circuit board.

With respect to independent Claim 52, the EXCELLON HVP, 689 and Concept 129 systems embody a method for operating a printed circuit board drilling machine having a worktable for supporting a plurality of circuit boards, a plurality of spindles each associated with a drill bit, and a controller configured to control the operation of the drilling machine. Operation of the EXCELLON HVP, 689 and Concept 129 systems comprise, positioning the plurality of circuit boards on the work table such that each of the plurality of circuit boards is associated with a spindle and a drill bit;

Appl. No. : 10/041,767  
Filed : January 7, 2002

drilling to a point within each of the plurality of printed circuit boards; retracting the plurality of drill bits a retract distance, the retract distance configured such that a tip end of the plurality of drill bits remains below a top surface of each of the plurality of printed circuit boards, drilling a distance greater than the retract distance into each of the plurality of printed circuit boards, retracting the plurality of drill bits a second retract distance, the second retract distance configured such that a tip end of the plurality of drill bits remains below a top surface of each of the plurality of printed circuit boards, drilling a distance greater than the second retract distance into each of the plurality of printed circuit boards, retracting the plurality of drill bits a third retract distance, the third retract distance configured such that a tip end of the plurality of drill bits remains below a top surface of each of the plurality of printed circuit boards, and drilling a distance greater than the third retract distance into each of the plurality of printed circuit boards.

I will refer to the method of operating a printed circuit board drilling machine as described above with reference to Claims 35 and 52 as the "quick peck technique" and I will refer to the printed circuit board drilling machine described above with reference to Claim 18 as the "quick peck apparatus".

6. The EXCELLON HVP, 689 and Concept 129 drilling systems have met a long-felt need in the field of printed circuit board drilling machines. The manufacture of printed circuit boards typically requires the drilling of thousands of small holes into each printed circuit board. The holes may be drilled with a drill bit having a diameter as small as 2 thousandths of an inch, which is about as small as a human hair.

Given the number of holes to be drilled and the size of these holes, a vital concern in the field of printed circuit board manufacturing is the speed that the machine drills holes. This is usually referred to as the productivity or throughput of the drilling machine. As mentioned above, I have worked for over 28 years either for a manufacturer of printed circuit board drilling machines or in the industry of creating printed circuits boards. During my career, it has been my experience that printed circuit board manufacturers are obsessed with productivity. Accordingly, even small increases in productivity can drive sales of printed circuit board drilling machines. To capture these sales, manufacturers of printed circuit board drilling machines are constantly seeking to increase the productivity of their printed circuit board drilling machines. I have been personally involved in this quest to increase the productivity of printed circuit board drilling machines for over 8 years.

As indicated in Figure 4 of the '767 application, which is attached to this declaration, the quick peck technique and apparatus as embodied in the EXCELLON HVP, 689 and Concept 129 systems may theoretically reduce drilling times by 10% to about 55% and in practice have been shown to reduce drilling times by about 10% to about 30%. This time saving is may be estimated from the

Appl. No. : 10/041,767  
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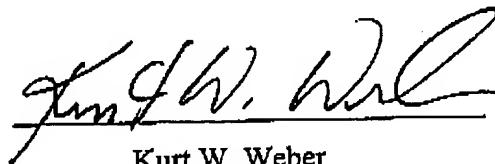
following equation:  $DS = (N - 2) * I + A$  where  $DS$  = distance saved,  $N$  = increment number,  $I$  = increment length  $A$  = initial retract height. In typical applications, I have observed an average time saving of about 2 hours per board for typical "back plane type" printed circuit board applications as compared to drilling machines that do not use the quick peck technique or are not configured as the quick peck apparatus. As such, the quick peck technique and apparatus as embodied by the EXCELLON HVP, 689 and Concept 129 drilling systems provide a dramatic improvement in productivity over prior art printed circuit board drilling machines.

7. The EXCELLON HVP, 689 and Concept 129 drilling systems, manufactured and sold by Excellon has been extremely commercially successful around the world. Presently, over 300 units have been sold globally. With respect to Excellon's previous drilling system that did not embody the quick peck technique and apparatus, these new systems represent a quantum leap forward in the back plane industry, which up until now only a hand full of companies have had limited success due to the long run times (e.g., up to 12 hours) and large amounts of deflection of the drill bits when traveling through a very thin printed circuit boards.

8. I declare under penalty of perjury under the laws of the State of California that, to the best of my knowledge, the forgoing is true and correct. Executed this 11<sup>th</sup> day of June, 2004 at Torrance, California.

Dated: \_\_\_\_\_

6/16/04



Kurt W. Weber